

Smoke Plume Detection on Satellite Imageries Using CNN With Simulated Smoke Images

Chenguang Hou (1), Celvin Tan (1), Soo Chin Liew (1)

¹ Centre for Remote Imaging, Sensing and Processing (CRISP), National University of Singapore, 10 Lower Kent Ridge Road, Blk S17, Level 2, Singapore 119076
Email: crshc@nus.edu.sg; crsct@nus.edu.sg; scLiew@nus.edu.sg

Abstract: In fire monitoring activities based on satellite data, smoke plumes which are direct tell-tale signs of active fires, are usually examined to eliminate false alarms in hotspot detection. In this study, a bottom-up CNN model was developed to detect smoke plumes in high resolution satellite imageries. Due to the lack of enough training data, simulated smoke plumes were stacked with real satellite images to generate synthetic datasets. To boost the robustness of the deep learning model, simulation parameters, fire locations and wind directions were randomly selected in the synthetic process. After trained on the datasets containing both real and synthetic smoke images, the proposed model is able to detect smoke plumes as well as fire locations and wind directions.

Keywords: deep learning, smoke plume detection, simulated smoke images.